Estuarine Bycatch Assessment in NC Commercial Fisheries

Report to

NOAA National Marine Fisheries Service
Atlantic Coastal Cooperative Statistics Program

Grant Award Period: July 1, 2009 – December 31, 2010

Brian Conrad
Marine Fisheries Biologist
North Carolina Department of Environment and Natural Resources,
Division of Marine Fisheries
Morehead City, NC

June 2011

This project was funded by the North Carolina Division of Marine Fisheries through Grant #NA09NMF4740160 of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under the Atlantic Coastal Cooperative Statistics Program.

ABSTRACT

The North Carolina Division of Marine Fisheries (NCDMF) has obtained data from commercial gillnet fisheries since 2004, in an attempt to establish a comprehensive, year-round statewide observer program for the purpose of collecting effort, catch, and bycatch data from commercial fisheries in order to better manage stocks and protect resources (Price 2007). This project continued data collections in commercial gillnet fisheries throughout the inshore, estuarine and riverine waters of North Carolina. During the project period, from July 1, 2009 – December 31, 2010, 831 commercial gillnet observations were completed. Of these, there were 711 in the large mesh gill net fishery. Observer efforts were concentrated in areas where the gillnet fishery effort was actively engaged. Gill net observation efforts and coverage were not static; they fluctuated based upon variations in finfish distribution, abundance change, commercial fishing behaviors, weather, as well as other factors.

During the project period observer efforts were spatially distributed throughout the estuarine waters of North Carolina. Observer coverage of the commercial gillnet fishery ranged from 0.06 – 83.33%. Coverage was maintained by both the onboard observer program as well as the alternative platform (AP) observer program. Observer coverage estimates were initially calculated based upon prior NCDMF Trip Ticket Program data, which is based solely on the number of trips within a management area. Accurate effort coverage estimates are ideally obtained by estimating the percent of total fishing effort (yards fished * soak time) (Price 2009). Gillnet observer sample data included the sampling of entire catches, as well as the recording of species weights and lengths, gear parameters, set locations, as well as catch and bycatch data. All commercial gill net interactions with protected species were recorded. Species, length, width and tag information were recorded for each sea turtle interaction. Sea turtles were tagged and released when feasible. No marine mammal interactions were recorded.

On October 22, 2009, the large mesh gillnet fishery in the Pamlico Sound Gill Net Restricted Area (PSGNRA) was closed due to the estimated live green sea turtle captures exceeding the Incidental Take Permit (ITP) allowance parameters that authorized this fishery to exist. The PSGNRA was designed to allow a limited, shallow water gillnet fishery and to protect endangered/threatened sea turtles (ESA 1973). Small mesh gillnet observations continued in the PSGNRA. Also occurring on this date, a 60-day Notice of Intent (NOI) to sue the NCDMF and the North Carolina Marine Fisheries Commission (NCMFC) was received from the Duke Environmental Law and Policy Clinic on behalf of the Karen Beasley Sea Turtle Rescue and Rehabilitation Center Foundation (Beasley Center). A Settlement Agreement was implemented on May 15, 2010 between all parties. From this agreement NCDMF issued Proclamation M-8-2010 on June 11, 2010 which from June 13, 2010 established a stretch mesh size range of 4-6 ½ inch for large mesh gill nets; limited soak times to an hour before sunset to an hour after sunrise, Monday through Friday; large mesh gillnets were required to be constructed with a net height of no more than 15 meshes, without a lead core or leaded bottom line, without corks or floats other than needed for identification; a maximum of 2,000 yards of large mesh gill nets allowed to be used per vessel; maximum shot length of 100 yards with a 25 yard break between shots. Fishermen in the southern portion of the state were allowed to use floats on nets but were restricted to the use of a maximum of 1,000 yards of large mesh gill net. Other measures have been modified slightly several times, with the concurrence of the Beasley Center, to improve gear efficiency or adjust fishing area boundaries without compromising the sea turtle conservation provisions of the Settlement Agreement. Another provision of the Settlement Agreement requires NCDMF to achieve a minimum of 7% observer coverage per week of internal coastal waters large mesh gill net fisheries. The provisions of the Settlement

Agreement remain in effect until NCDMF can obtain a statewide ITP from the National Marine Fisheries Service (NMFS). Observer data will be used in Fishery Management Plan development, stock assessments and to make informed management decisions in a timely fashion (Price 2009).

ACKNOWLEDGMENTS

The North Carolina Division of Marine Fisheries would like to sincerely thank the Atlantic Coastal Cooperative Statistics Program (ACCSP) for funding the activities under this program in the past and currently. NCDMF has been trying to establish a long-term observer program to assist in active management of North Carolina commercial and recreational fisheries. For the last four years, ACCSP has greatly assisted in these efforts.

Additionally, NCDMF would like to thank the commercial fishing industry for their willingness to take on-board observers and supply data that can be integral in sustaining the resources and the continuation of their livelihoods. Finally, NCDMF would like to thank the numerous observer staff members who have given their time and efforts towards this program.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The North Carolina Division of Marine Fisheries has obtained data from commercial gillnet fisheries since 2004, in an attempt to establish a comprehensive, year-round statewide observer program (Price 2007). This program almost exclusively concentrated observations in large mesh (≥ 5 in. stretch) gillnet operations, however some small (< 5 in. stretch) mesh gillnet operations were observed. The need for this program dates to the North Carolina Fisheries Reform Act (FRA 1997), which established a process for the preparation of Fishery Management Plans (FMPs). The FRA states, "The goal of the plans will be to ensure that long-term viability of the State's commercially and recreationally significant species or fisheries." A primary component of long-term sustainability of fisheries is characterizing discards, and subsequent mortality that may have the potential to negatively impact coastal finfish stocks.

Characterizing discards in commercial fisheries through an observer program allows for the collection of real time data that can be used by fishery managers to respond to potential problems and provide fishery managers with data unavailable from other sources. There are many commercial fisheries that operate throughout the estuarine waters of North Carolina, some of which are suspected or in some cases known sources of significant bycatch. The NCDMF continuously conducts research (e.g., fishery dependent gear research projects) and gathers data (e.g., fishery independent and dependent monitoring surveys) from commercial fisheries to quantify and monitor bycatch issues or assist in developing bycatch-reducing commercial fishing gear (Price and Salisbury 2007, Price 2007, Brown 2009).

Estimating discards in commercial fisheries is a necessary component for sustaining valuable commercial and recreational fishery resources. Management of fisheries often entails implementing measures designed to reduce bycatch and sustain target catches that may provide income and sustenance to future generations. The NCDMF uses many management measures such as gear restrictions, seasonal closures, and size limit restrictions in estuarine commercial and recreational fisheries. These management measures are designed to significantly reduce, if not eliminate, bycatch. However, accurate estimates of total fishing effort, catch and bycatch in all commercial fisheries are limited making it difficult to determine the effectiveness of many management measures.

One of the goals of this program is to develop an overall estimate of bycatch in commercial gillnet fisheries. This is difficult to fully quantify because accurate, total effort in commercial gillnet fisheries throughout the estuarine waters of North Carolina is unknown. Commercial gillnet effort here is defined as the total number of yards fished multiplied by the total soak time (hrs) the gear is actively fishing. The effort component in total bycatch calculations is critical due to the obvious potential differences between catches from a small operation (e.g., 200 yd of gillnet) soaked for 12 hours compared to a larger operation (e.g., 1000 yd of gillnet) soaked for 24 hours. Fishery managers attempt to alleviate this problem through the use of the NCDMF Trip Ticket Program, which requires all commercial landings to be documented on a trip ticket by seafood dealers.

The trip tickets require fishermen license numbers, species harvested, quantity harvested, gear used, area of operation, and day of catch. Trip tickets do not obtain data on discards such as the species discarded and their disposition. Trip tickets can provide the number of total trips by gear type and area, which provide a means to assess the relative magnitude of fishing effort. It is important for fishery managers to understand discards, total effort, area of operation, and gear configurations of fisheries in order to estimate discards and discard mortality, and to make informed management decisions. While total effort (yards * soak

time) is not obtainable at this time, NCDMF Trip Tickets used in conjunction with observer data can be used to make generalized estimates and allow for hot spots or areas of concern to be identified.

The purpose of this program is to collect effort, catch, and bycatch data (protected species and finfish) from North Carolina commercial gillnet fisheries to utilize in stock assessments, FMPs, and to make better management decisions. This program has been funded by multiple entities since 2004 including state appropriations, the U.S. Fish and Wildlife Service, and currently under the ACCSP. The program includes both onboard commercial gillnet observations as well as alternative platform (AP) observations. During AP observations, catch data are recorded from program owned vessels while in close proximity to the commercial gillnet activity.

The overall objectives of this grant are to expand commercial gillnet observations to collect effort, catch, and bycatch data to use in stock assessments, FMPs, and to make better management decisions to sustain coastal finfish stocks. Additionally, this project is designed to obtain estimates of finfish discards in commercial fisheries including recreationally important finfish species (e.g., striped bass *Morone saxatilis*, red drum *Sciaenops ocellatus*, southern flounder *Paralichthys lethostigma*, and spotted seatrout *Cynoscion nebulosus*). Information is also collected for protected species interactions including: bottlenose dolphin *Tursiops truncatus*, loggerhead *Caretta caretta*, green *Chelonia mydas*, Kemp's ridley *Lepidochelys kempii*, hawksbill *Eretmochelys imbricata*, and leatherback *Dermochelys coriacea* sea turtles.

METHODS

Beginning in July 2009, five observers were hired and trained under NCDMF data collection protocols and National Marine Fisheries Service (NMFS) staff provided training on protected species identification, handling, and tagging protocols. Observers were provided a list of all licensed commercial gillnet fishermen by area from both license and NCDMF Trip Ticket data. Observers were responsible for contacting and establishing weekly trips with commercial fishermen. Observer sampling effort was weighted by region to ensure that observer coverage was proportionally applied to fishing effort. Trip ticket data from previous years were used to achieve this goal. NCDMF began obtaining observations in commercial gillnet fisheries in July 2009. Observers primarily targeted large (> 5 in stretch) mesh gillnet trips, but also obtained small (< 5 in stretch) mesh gillnet trips when feasible.

Data collections for the onboard observer program included: enumerating, measuring, weighing, and recording disposition (kept, unmarketable discard, regulatory discard) of all target and bycatch species; and recording date, time, location (latitude/longitude), and gear characteristics (e.g., effort (yards * soak days), net height, hang ratio, twine size, mesh size) of all sets and retrievals. Protected species were measured, tagged, and released and/or brought in for post-mortem examination.

Data collections for the AP observer program included the gear parameters of the onboard observer program, but only collected the weights of kept catch with regard to disposition data.

Initially a target of 2% coverage of the total fishing effort was set by area and season. This was determined by using trip frequencies from the NCDMF Trip Ticket Program. It is important to note that trip tickets do not account for the total fishing effort (yards * soak days),

and only record the total number of trips. Therefore, coverage estimates were based solely on number of trips reported, and observed. A required target of 7% coverage of the total fishing effort was required after May 15, 2010 for compliance with the Settlement Agreement with the Duke Environmental Law and Policy Clinic and the Beasley Center.

Observers were deployed aboard commercial fishing and AP vessels throughout the Pamlico Sound, as well as in the Neuse, Pamlico and New River systems in North Carolina. Observers collected effort, catch, and bycatch data for all species for each trip from July 2009 - December 2010.

Coverage Estimates

Data were stratified by year, season, and area fished (waterbody). Seasons were defined as: Winter (January – March); spring (April – June); summer (July – September); and fall (October – December). From the NCDMF Trip Ticket Program the total number of reported trips by mesh size (large or small mesh) were determined for the purpose of calculating an estimated percent coverage by area based upon the number of trips observed and reported. In the NCDMF Trip Ticket Program dealers are not required to report the total yards fished during each operation, and dealers may report up to three gear codes for each trip ticket. This may confound precisely determining the species landed by each gear type, and further make it difficult to accurately establish the target species of each operation (Price 2007).

RESULTS

Commercial observations in gillnet fisheries began in July 2009 throughout the estuarine waters of North Carolina (Figure 1 , 2). Observers were responsible for obtaining trips aboard commercial gillnet vessels throughout the estuarine waters of North Carolina during all months of the year. The data included in this report were collected through multiple funding sources (state appropriations and Federal grants) beginning in July 2010. The following reported results are inclusive of observations conducted across these multiple funding sources from July 2009 – December 2010.

Observers covered 831 onboard gillnet trips from July 2009 - December 2010; of these, 711 were large mesh observations and 120 were small mesh observations (Table 1). There were 560 AP gillnet observations trips from January 2010 - December 2010; of these, 458 were large mesh observations and 102 were small mesh observations (Table 2).

Observed Areas

Data presented throughout this report depict observations conducted in the gillnet fishery within the estuarine waters of North Carolina.

Using NCDMF trip ticket data for number of trips reported, a relative percent coverage was calculated for these areas observed. The coverage ranged from 0.06 – 83.33% by season and area (Table 2, 3). It should be noted that trip tickets lack the necessary effort (yards of gillnet * soak time) component typically used for coverage estimation, and extrapolation of catches. Observations by area were grouped to match available waterbodies in the trip ticket database. In some instances, trip ticket areas may not have been reported accurately by fishermen, resulting in occurrences where the number of observed trips exceeds the number of

reported trips for a given area. These inaccuracies led to coverage results of 0% and exceeding 100% (Table 3, 4).

The areas observed included Atlantic Ocean (AO), Albemarle Sound (AS), Bogue Sound (BO), Back Sound (BS), Bay River (BO), Cape Fear River (CF), Croatan Sound (CR), Core Sound (CS), Currituck Sound (CU), Lockwood Folly River (LF), MGNRA (M), Masonboro Sound (MA), Myrtle Grove Sound (MG), Middle Sound (MS), New River (NE), North River (NO), Newport River (NP), Neuse River (NR), Pamlico River (PR), Pamlico Sound (PS), Pungo River (PU), Roanoke Sound (RS), Shallotte River (SH), South River (SR), Stump Sound (SS), Straits (ST), Sunset Beach (SU), Turnigan Bay (TB), Trent River (TR), Topsail Sound (TS) and White Oak River (WO). Observations in the Atlantic Ocean are trips that occurred within the inlets.

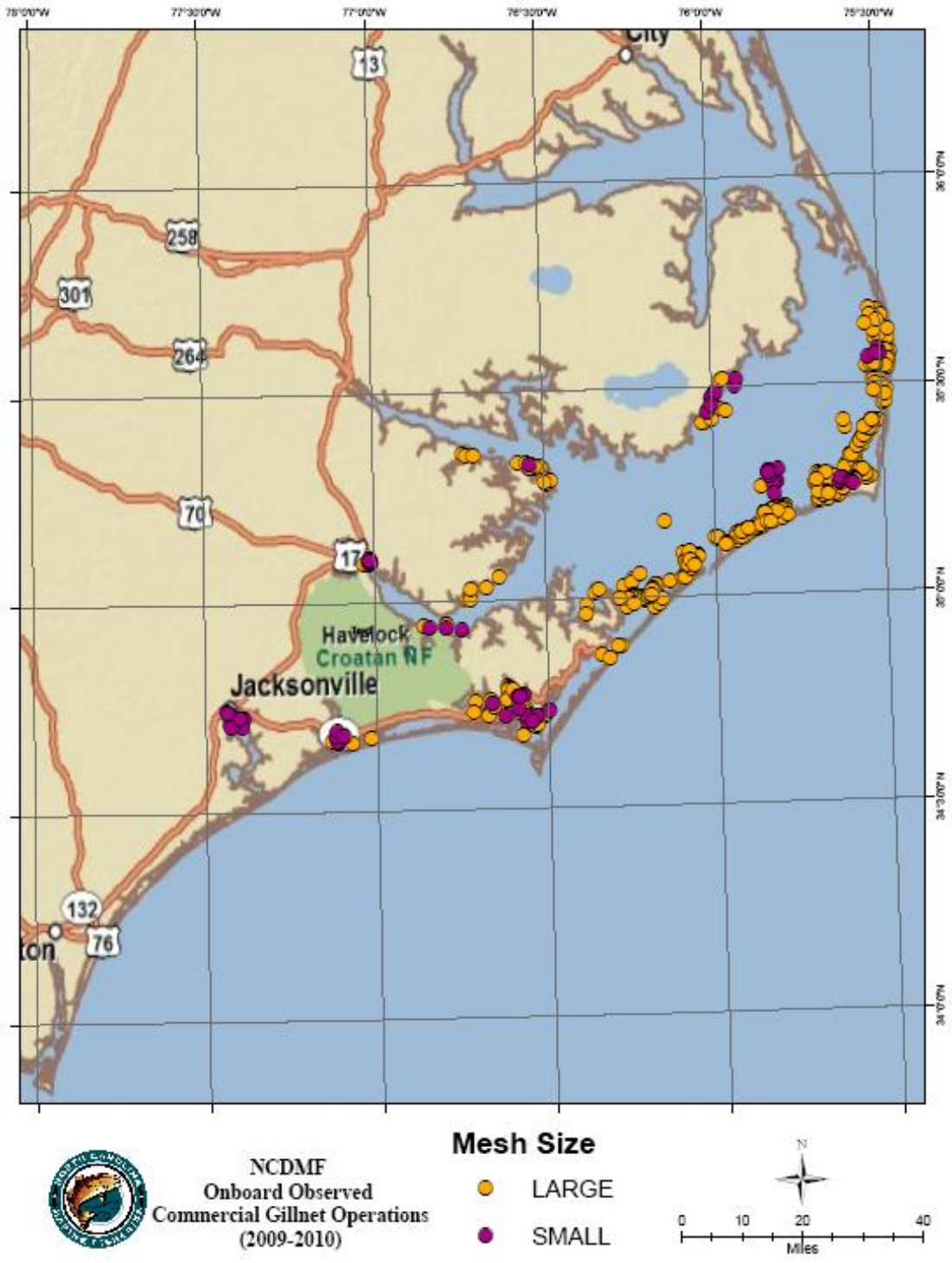

Figure 1. Map of estuarine and riverine systems in North Carolina depicting onboard observed commercial gillnet operations, both large and small mesh, from 2009-2010.

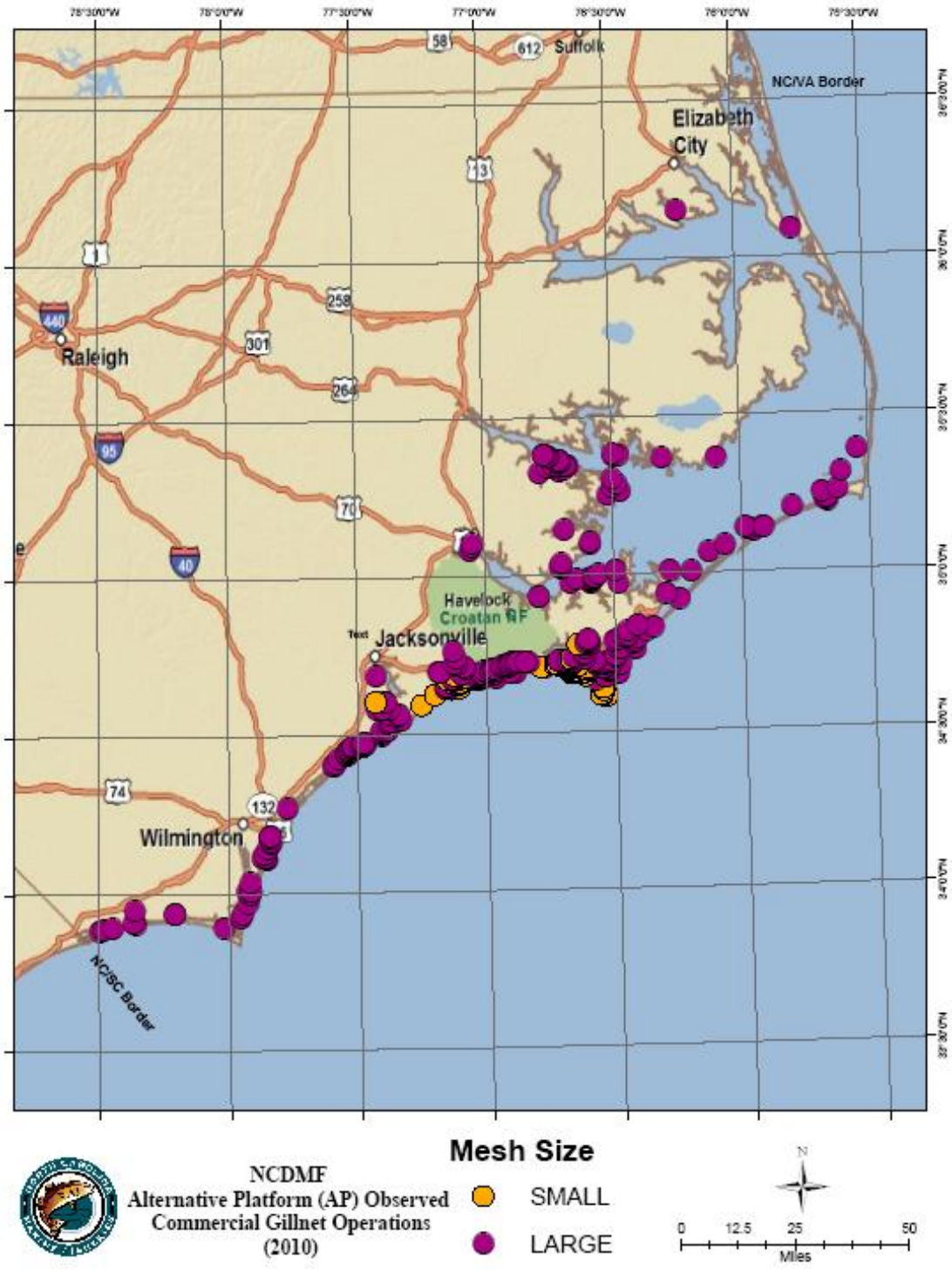

Figure 2. Map of estuarine and riverine systems in North Carolina depicting observed commercial gillnet operations, both large and small mesh, from 2009-2010.

Table 1. The total number of large (> 5 in. stretch) and small mesh (< 5 in. stretch) combined trips and effort (yd * soak day) by area through onboard observations throughout the estuarine and riverine waters of North Carolina from July 2009 – December 2010.

	Small Mesh		Large Mesh		Total	
Area	**Trips**	**Effort**	**Trips**	**Effort**	**Trips**	**Effort**
Atlantic Ocean	8	14,700	1	800	9	15,500
Bogue Sound	2	1,150	4	2,900	6	4,050
Back Sound			1	600	1	600
Core Sound	2	300	10	11,300	12	11,600
PSGNRA-M1	2	1,400	3	3,200	5	4,600
PSGNRA-M2			1	900	1	900
New River	25	10,930	4	1,550	29	12,480
North River	12	2,500	11	4,700	23	7,200
Newport River	1	200	16	6,850	17	7,050
Neuse River	18	2,000	58	14,239	76	16,239
Pamlico River			5	4,920	5	4,920
Pamlico Sound	41	32,700	30	39,720	71	72,420
PSGNRA-S1			56	51,690	56	51,690
PSGNRA-S2			131	67,380	131	67,380
PSGNRA-S3			130	154,645	130	154,645
PSGNRA-S4	4	400	239	129,884	243	130,284
Straits	3	350	9	4,900	12	5,250
West Bay			1	1,980	1	1,980
White Oak	2	570	1	1,440	3	2,010
Totals	**120**	**67,200**	**711**	**503,598**	**831**	**570,798**

Table 2. The total number of large (> 5 in. stretch) and small mesh (< 5 in. stretch) combined trips and effort (yd * soak day) by area through alternative platform observations throughout the estuarine and riverine waters of North Carolina from January 2010 – December 2010.

	Large Mesh		Small Mesh		Total	
Area	**Trips**	**Effort**	**Trips**	**Effort**	**Trips**	**Effort**
	1	2,000	1		2	2,000
Albemarle Sound	10	5,680	1		11	5,680
Bogue Sound	85	8,005	50	540	135	8,545
Back Sound	4	300	9		13	300
Bay River	1	100			1	100
Cape Fear River	14	1,200	1	100	15	1,300
Croatan Sound	2	200			2	200
Core Sound	33	3,145			33	3,145
Currituck Sound	2	200			2	200
Haystacks			1		1	0
Lockwood Folly River	3	300			3	300
MGNRA	13	1,300			13	1,300
Masonboro Sound	10	1,100			10	1,100
Myrtle Grove Sound	8	850			8	850
Middle Sound	1	100			1	100
New River	22	2,250	10	1,780	32	4,030
North River	24	2,400	4		28	2,400
Newport River	6	600	8		14	600
Neuse River	18	1,725			18	1,725
Ocracoke Corridor	1	100			1	100
Oregon Inlet Corridor	1	400			1	400
Pamlico River	59	5,750			59	5,750
Pamlico Sound	19	1,620			19	1,620
Pungo River	7	525			7	525
Roanoke Sound	2	200			2	200
SGNRA-2	1	200			1	200
SGNRA-3	8	600			8	600
SGNRA-4	6	500			6	500
Shackleford Banks			12		12	0
Shallote River	3	250	1		4	250
South River	8	800			8	800
Stump Sound	47	4,650	2	200	49	4,850
Straits	4	400			4	400
Sunset Beach	3	300			3	300
Turnigan Bay	2	300			2	300
Trent River	3	300			3	300
Topsail Sound	6	540			6	540
White Oak River	21	2,050	2	200	23	2,250
TOTALS	**458**	**50,940**	**102**	**2,820**	**560**	**53,760**

Table 3. Observed large mesh gillnet trips from both onboard (July 2009 - December 2010) and AP (January 2010 – December 2010) observations compared to the reported number (Rep Trips) of trips and a relative percent coverage.

	Winter			Spring			Summer			Fall		
Area	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage
AO	1	952	0.11									
AS							3	2,282	0.13	7	2,664	0.26
BO				13	22	59.09	45	202	22.28	30	172	17.44
BS				1	17	5.88	3	113	2.65	1	26	3.85
BY							1	233	0.43			
CF				5	52	9.62	5	96	5.21	4	33	12.12
CR							1	1,284	0.08	1	1,126	0.09
CS				19	706	2.69	18	1,311	1.37	19	677	2.81
CU										2	610	0.33
LF							3	41	7.32			
M							4			9		
MA				1	15	6.67	8	44	18.18	1	41	2.44
ME							1					
MG				2			4			2		
MS							1					
NE	4	9	44.44	10	68	14.71	3	444	0.68	8	331	2.42
NO				7			20			8		
NP				2	4	50.00	3	53	5.66	17	33	51.52
NR	34	376	9.04	19	152	12.50	22	764	2.88	1	249	0.40
OC				1								
OI							1					
PR	1	323	0.31	13	202	6.44	38	985	3.86	12	516	2.33
PS	3	292	1.03	16	706	2.27	259	4,155	6.23	347	2,743	12.65
PU							5	57	8.77	2	27	7.41
RS				1	139	0.72				1	559	0.18
SH							2	33	6.06	1	3	33.33
SR				1	7	14.29	2	9	22.22	5	6	83.33
SS				3	12	25.00	29	290	10.00	15	175	8.57
SU							3					
TB				1						1		
TR				2			1					
TS				1	52	1.92	3	276	1.09	2	194	1.03
WO				7	55	12.73	7	166	4.22	8	85	9.41
TOTALS	**42**	**1,000**	**4.20**	**125**	**2,209**	**5.66**	**495**	**12,838**	**3.86**	**504**	**10,270**	**4.91**

Table 4. Observed small mesh gillnet trips from both onboard (July 2009 - December 2010) and AP (January 2010 – December 2010) observations compared to the reported number (Rep Trips) of trips and a relative percent coverage.

	Winter			Spring			Summer			Fall		
Area	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage	Obs Trips	Rep Trips	% Coverage
AO	8	1,289	0.62									
AS										1	991	0.10
BO							46	45	102.22	5	110	4.55
BS				1			6	2	300.00	2	25	8.00
CF										1	60	1.67
CS										5	430	1.16
NE	19	115	16.52	1	73	1.37	5	206	2.43	10	232	4.31
NO	2						4			10		
NP							8	4	200.00	1	13	7.69
NR	13	102	12.75	4	32	12.50				1	125	0.80
PS	14	461	3.04				1	1,784	0.06	32	1,105	2.90
SB							12					
SH							1	62	1.61			
SS							1	8	12.50	1	14	7.14
WO				2	10	20.00				2	73	2.74
TOTALS	**56**	**1,967**	**2.85**	**8**	**115**	**6.96**	**84**	**2,111**	**3.98**	**71**	**3,178**	**2.23**

Catch

Onboard Observed Large Mesh Catches

There were more than 37,605 individual (finfish, birds, reptiles) observed from large mesh gillnet operations from July 2009 - December 2010. Collectively, 52.7% of the catches by number were comprised of southern flounder *Paralichthys lethostigma,* Atlantic menhaden *Brevoortia tyrannus,* red drum *Sciaenops occellatus,* sheepshead *Archosargus probatocephalus,* and bluefish *Pomatomus saltatrix.*

By weight (kg), southern flounder represented the majority (64%), with red drum accounting for 8.3%, followed by sheepshead (6.7%), bluefish (6%) and American shad (3.4%) (Table 4).

Onboard Observed Small Mesh Catches

There were more than 24,828 individuals (finfish) observed from small mesh gillnets from July 2009 - December 2010 (Table 5). Small mesh catches were dominated in number with kingfishes (Menticirrhus spp.) (32%), Atlantic menhaden (29%), Atlantic croaker (23%) and weakfish (2%). By weight (kg), spotted seatrout represented the majority (23%), with weakfish accounting for 17%, Atlantic menhaden accounting for 12%, stripped mullet accounting for 10%, and kingfishes and hickory shad at 9%. There were 90 red drum, 258 Southern flounder, and 209 bluefish representing 1% of the observed catches by number in small mesh operations (Table 5).

Onboard Observed Seabird Bycatch

Three hundred twenty-two (322) seabirds were observed in large mesh gillnet operations and twelve were observed in small mesh gillnet operations from July 2009 - December 2010 (Tables 4, 5). There were 299 double-crested cormorants *Phalacrocorax auritus* observed in large mesh and 6 in small mesh*;* 5 great black-backed gull *Larus marinus* observed in large mesh; with 3 brown pelicans *Pelecanus occidentalis* in large mesh and one in small mesh. Fifteen common loons *Gavia immer* were observed in large mesh, with two being observed in small net gill net operations. Three ruddy ducks *Oxyura jamaicensis* were observed in the small mesh gillnet fishery (Tables 4, 5).

Onboard Observed Atlantic Sturgeon

There were no Atlantic sturgeon *Acipenser onxyrinchus* observed in either large or small mesh gillnet operations from July 2009 - December 2010 (Tables 4, 5).

Onboard Observed Protected Species Bycatch

There were 47 observed sea turtle interactions from July 2009 - December 2010 through the onboard observation program. These consisted of one hawksbill, 38 green, 6 Kemp's ridley and two loggerhead sea turtles (Tables 4, 5). No sea turtle interactions were observed from small mesh gillnet effort. There were no observed marine mammal interactions in either small or large mesh gillnet operations (Tables 4, 5).

AP Observed Large and Small Mesh Catches

AP observations of large mesh catches consisted of 100 large mesh gillnet sets, composed of 617 total nets with a total yardage of 70,295 yards. AP large mesh kept catch totaled 1,765 kg of finfish. AP observations of small mesh catches consisted of one 100 yard small mesh gillnet with an observed kept catch of 0.9kg.

AP Observed Protected Species Bycatch

There were 40 observed sea turtle interactions from January 2010 - December 2010 through the AP observation program. These consisted of two loggerhead, 19 green and 19 Kemp’s ridley sea turtles. These sea turtles were observed in 28 total large mesh gillnet sets consisting of 39 individual nets encompassing 3,930 total yards

Table 5. Species observed by total number, percent number, total weight in kg (of those weighed), and relative percent biomass from onboard large mesh gillnet observations from July 2009 – December 2010.

Species	Common Name	Total #	% Number	Total Wt (kg)	% Biomass
P. lethostigma	Southern Flounder	14,615	38.86	11,630	63.60
S. ocellatus	Red Drum	815	2.17	1,517	8.30
A. probatocephalus	Sheepshead	1,467	3.90	1,221	6.67
P. saltatrix	Bluefish	2,508	6.67	1,101	6.02
A. sapidissima	American Shad	412	1.10	622	3.40
B. tyrannus	Atlantic Menhaden	9,402	25.00	470	2.57
T. carolinus	Florida Pompano	287	0.76	313	1.71
P. cromis	Black Drum	199	0.53	292	1.59
P. dentatus	Summer Flounder	260	0.69	203	1.11
A. catus	White Catfish	86	0.23	148	0.81
M. saxatilis	Striped Bass	88	0.23	123	0.67
P. albigutta	Gulf Flounder	223	0.59	119	0.65
C. nebulosus	Spotted Seatrout	84	0.22	86	0.47
C. regalis	Weakfish	239	0.64	79	0.43
A. mediocris	Hickory Shad	67	0.18	74	0.40
M. cephalus	Striped Mullet	41	0.11	61	0.33
M. undulatus	Atlantic Croaker	203	0.54	32	0.18
M. canis	Smooth Dogfish	68	0.18	24	0.13
C. faber	Atlantic Spadefish	50	0.13	19	0.10
A. calva	Bowfin	8	0.02	18	0.10
L. xanthurus	Spot	135	0.36	18	0.10
M. americanus	Southern Kingfish	35	0.09	12	0.06
C. carpio	Common Carp	4	0.01	11	0.06
L. polyphemus	Horseshoe Crab	271	0.72	10	0.05
C. mydas	Green Turtle	38	0.10	8	0.05
S. maculatus	Spanish Mackerel	11	0.03	8	0.04
D. cepedianum	Gizzard Shad	16	0.04	8	0.04
L. osseus	Longnose Gar	8	0.02	8	0.04
Menticirrhus spp.	Kingfishes	39	0.10	8	0.04
S. foetens	Inshore Lizardfish	62	0.16	7	0.04
P. olivaris	Flathead Catfish	2	0.01	7	0.04
E. saurus	Ladyfish	9	0.02	5	0.03
Ictalurus spp.	Ictalurus Catfishes	2	0.01	4	0.02
R. canadum	Cobia	6	0.02	3	0.01
R. terraenovae	Atlantic Sharpnose Shark	1	0.00	2	0.01
I. punctatus	Channel Catfish	2	0.01	2	0.01
O. chrysoptera	Pigfish	26	0.07	2	0.01
M. littoralis	Gulf Kingfish	6	0.02	2	0.01
L. surinamensis	Atlantic Tripletail	1	0.00	2	0.01
L. rhomboides	Pinfish	90	0.24	1	0.01
S. tiburo	Bonnethead Shark	5	0.01	1	0.01
B. capriscus	Gray Triggerfish	1	0.00	1	0.01
C. hippos	Crevalle Jack	2	0.01	1	0.01
D. sabina	Atlantic Stingray	572	1.52	1	0.01
G. micrura	Smooth Butterfly Ray	487	1.30	1	0.01
C. limbatus	Blacktip Shark	3	0.01	0	0.00
Triglidae	Searobins	22	0.06	0	0.00

Table 5 (cont). Species observed by total number, percent number, total weight in kg (of those weighed), and relative percent biomass from onboard large mesh gillnet observations from July 2009 – December 2010.

Species	Common Name	Total #	% Number	Total Wt (kg)	% Biomass
O. tau	Oyster Toadfish	7	0.02	0	0.00
T. onitis	Tautog	1	0.00	0	0.00
A. quadrocellata	Ocellated Flounder	1	0.00	0	0.00
S. aquosus	Windowpane	3	0.01	0	0.00
M. microlepis	Gag	1	0.00	0	0.00
L. maximus	Hogfish	2	0.01	0	0.00
Hippocampus spp.	Seahorses	1	0.00	0	0.00
P. triacanthus	Butterfish	1	0.00	0	0.00
Neogastropoda stenoglossa	Conchs	52	0.14		
Busycon spp.	Whelks	2	0.01		
B. carica	Knobbed Whelk	1	0.00		
B. canaliculatus	Channeled Whelk	23	0.06		
C. virginica	Eastern Oyster	9	0.02		
Mercenaria spp.	Quahogs	1	0.00		
Libinia spp.	Libinia Spider Crabs	12	0.03		
C. sapidus	Blue Crab	1,175	3.12		
M. mercenaria	Florida Stone Crab	44	0.12		
P. marinus	Sea Lamprey	1	0.00		
Scyliorhinidae	Cat Sharks	6	0.02		
C. plumbeus(milberti)	Sandbar Shark	2	0.01		
Sphyrna spp.	Hammerhead Sharks	1	0.00		
S. acanthias	Spiny Dogfish	649	1.73		
S. dumeril	Atlantic Angel Shark	1	0.00		
R. eglanteria	Clearnose Skate	23	0.06		
Dasyatidae	Stingrays	6	0.02		
D. americana	Southern Stingray	262	0.70		
Gymnura spp.	Butterfly Rays	1	0.00		
M. freminvillei	Bullnose Ray	51	0.14		
R. bonasus	Cownose Ray	1,533	4.08		
M. atlanticus	Tarpon	1	0.00		
Esox spp.	Pikes	2	0.01		
Belonidae	Needlefishes	1	0.00		
P. evolans	Striped Searobin	2	0.01		
M. americana	White Perch	1	0.00		
R. remora	Remora	1	0.00		
B. chrysoura	Silver Perch	2	0.01		
Mugil spp.	Mullets	1	0.00		
Astroscopus spp.	Astroscopus Stargazers	54	0.14		
E. lyricus	Lyre Goby	24	0.06		
Paralichthys spp.	Paralicthid Flounders	286	0.76		
T. maculatus	Hogchoker	1	0.00		
Lagocephalus spp.	Lagocephalus Puffers	1	0.00		
C. schoepfii	Striped Burrfish	8	0.02		
C. guttata	Spotted Turtle	1	0.00		
M. terrapin	Diamondback Turtle	38	0.10		
C. caretta	Loggerhead	2	0.01		
E. imbricata	Hawksbill Turtle	1	0.00		
L. kempi	Kemp's Ridley	6	0.02		
G. immer	Common Loon	15	0.04		
P. occidentalis	Brown Pelican	3	0.01		
P. auritus	Double-crested Cormorant	299	0.80		
L. marinus	Great Black-backed Gull	5	0.01		
Totals		**37,605**	**100.00**	**18,288**	**100.00**

Table 6. Species observed by total number, percent number, total weight in kg (of those weighed), and relative percent biomass from onboard small mesh gillnet observations from July 2009 – December 2010.

Species	Common Name	Total #	% Number	Total Wt (kg)	% Biomass
C. nebulosus	Spotted Seatrout	403	1.62	377	22.28
C. regalis	Weakfish	599	2.41	285	16.85
B. tyrannus	Atlantic Menhaden	7,212	29.05	202	11.94
M. cephalus	Striped Mullet	315	1.27	170	10.03
Menticirrhus spp.	Kingfishes	8,015	32.28	152	8.98
A. mediocris	Hickory Shad	327	1.32	146	8.62
P. saltatrix	Bluefish	209	0.84	73	4.28
S. ocellatus	Red Drum	90	0.36	64	3.78
P. lethostigma	Southern Flounder	258	1.04	48	2.82
L. xanthurus	Spot	200	0.81	38	2.27
P. cromis	Black Drum	160	0.64	36	2.12
P. triacanthus	Butterfish	364	1.47	14	0.84
M. americanus	Southern Kingfish	37	0.15	13	0.77
M. saxatilis	Striped Bass	21	0.08	11	0.64
S. acanthias	Spiny Dogfish	479	1.93	10	0.60
T. lepturus	Atlantic Cutlassfish	13	0.05	10	0.56
A. sapidissima	American Shad	7	0.03	8	0.44
M. undulatus	Atlantic Croaker	5,648	22.75	6	0.35
Alosa spp.	River Herrings	14	0.06	4	0.21
M. littoralis	Gulf Kingfish	7	0.03	3	0.19
T. alalunga	Albacore	1	0.00	3	0.18
S. maculatus	Spanish Mackerel	4	0.02	3	0.17
Mugil spp.	Mullets	4	0.02	3	0.17
A. probatocephalus	Sheepshead	11	0.04	3	0.16
D. cepedianum	Gizzard Shad	16	0.06	3	0.15
Ictalurus spp.	Ictalurus Catfishes	2	0.01	2	0.14
M. americana	White Perch	9	0.04	2	0.12
O. chrysoptera	Pigfish	6	0.02	2	0.09
Paralichthys spp.	Paralicthid Flounders	5	0.02	1	0.08
P. dentatus	Summer Flounder	4	0.02	1	0.06
P. albigutta	Gulf Flounder	4	0.02	1	0.05
D. petenense	Threadfin Shad	1	0.00	0	0.02
L. rhomboides	Pinfish	16	0.06	0	0.02
T. carolinus	Florida Pompano	2	0.01	0	0.02
Neogastropoda stenoglossa	Conchs	7	0.03		
C. virginica	Eastern Oyster	6	0.02		
L. polyphemus	Horseshoe Crab	4	0.02		
Libinia spp.	Libinia Spider Crabs	19	0.08		
C. sapidus	Blue Crab	39	0.16		
M. mercenaria	Florida Stone Crab	5	0.02		
Scyliorhinidae	Cat Sharks	19	0.08		
M. canis	Smooth Dogfish	220	0.89		
R. eglanteria	Clearnose Skate	2	0.01		
G. micrura	Smooth Butterfly Ray	1	0.00		
L. osseus	Longnose Gar	1	0.00		
O. oglinum	Atlantic Thread Herring	1	0.00		
Triglidae	Searobins	6	0.02		
B. chrysoura	Silver Perch	2	0.01		
C. faber	Atlantic Spadefish	1	0.00		
E. lyricus	Lyre Goby	19	0.08		
Peprilus spp.	Peprilus Butterfish	1	0.00		
G. immer	Common Loon	2	0.01		
P. occidentalis	Brown Pelican	1	0.00		
P. auritus	Double-crested Cormorant	6	0.02		
O. jamaicensis	Ruddy Duck	3	0.01		
Totals		**24,828**	**100.00**	**1,692**	**100.00**

Discards

Onboard observed large and small mesh gillnet catches were coded by the disposition. Specifically, species were recorded as kept (sold to market, personal consumption, used for bait); unmarketable discards (mutilated by predation, unwanted); or regulatory discards (undersize/oversize, creel limits, seasonal closures, prohibited). No discard data is currently collected with AP observations.

Large Mesh Dispositions

By number, over 59% of all large mesh gillnet catches were kept, 35% were unmarketable discards and 6% were regulatory discards from July 2009 - December 2010 (Table 6). However, 50% of the unmarketable discards by number were Atlantic menhaden. A total of 7, 410 menhaden were caught, and 16% of these were kept, while the rest were unmarketable discards. Kept catch respective percentages to the total number of each species caught were: southern flounder (92%), Atlantic menhaden (16%), spiny dogfish (83%), American shad (100%), red drum (58%). There were also relatively high percentages kept of white catfish *A. catus* (100%), sheepshead (97%), hickory shad (97%), and Atlantic croaker (51%).

Regulatory discards were primarily comprised of southern flounder, which represented 52% of the total regulatory discards. Spiny dogfish, red drum and striped bass only represented another 19% of the total regulatory discards (Table 6).

Small Mesh Dispositions

Approximately 86% by number of all small mesh gillnet catches were kept, 11% were unmarketable discards and 3% were regulatory discards (Table 7). Small mesh catches that were kept were mostly made up of Kingfishes (35%) of total species Atlantic menhaden (27%), Atlantic croaker (27%) and weakfish (3%).

Nearly 60% of unmarketable discards were Atlantic menhaden (55%), kingfishes (20%), smooth dogfish (8%), black drum (4%) and hickory shad (3%). The majority (98%) of regulatory discards were comprised of spiny dogfish, southern flounder, red drum, spotted sea trout and river herrings (Table 7).

Table 7. Disposition (kept, unmarketable discard, regulatory discard) by number of species observed during onboard large mesh gillnet operations from July 2009 – December 2010.

Species	CommonName	Kept	Unmarketable	Reg Discard	Total #
P. lethostigma	Southern Flounder	13,454	42	1,099	14,595
B. tyrannus	Atlantic Menhaden	1,197	6,213	0	7,410
P. saltatrix	Bluefish	1,448	1,060	0	2,508
R. bonasus	Cownose Ray	0	1,533	0	1,533
A. probatocephalus	Sheepshead	1,421	42	4	1,467
C. sapidus	Blue Crab	66	1,109	0	1,175
S. ocellatus	Red Drum	469	45	301	815
S. acanthias	Spiny Dogfish	540	28	81	649
D. sabina	Atlantic Stingray	0	572	0	572
G. micrura	Smooth Butterfly Ray	0	487	0	487
A. sapidissima	American Shad	306	0	0	306
P. auritus	Double-crested Cormorant	0	1	296	297
T. carolinus	Florida Pompano	287	0	0	287
Paralichthys spp.	Paralicthid Flounders	283	0	3	286
L. polyphemus	Horseshoe Crab	1	270	0	271
D. americana	Southern Stingray	0	262	0	262
P. dentatus	Summer Flounder	209	1	50	260
C. regalis	Weakfish	169	37	33	239
P. albigutta	Gulf Flounder	102	3	118	223
M. undulatus	Atlantic Croaker	104	99	0	203
P. cromis	Black Drum	190	9	0	199
L. xanthurus	Spot	107	28	0	135
L. rhomboides	Pinfish	4	86	0	90
C. nebulosus	Spotted Seatrout	77	4	3	84
M. canis	Smooth Dogfish	53	15	0	68
S. foetens	Inshore Lizardfish	0	62	0	62
Astroscopus spp.	Astroscopus Stargazers	0	54	0	54
N. stenoglossa	Conchs	35	17	0	52
M. freminvillei	Bullnose Ray	0	51	0	51
C. faber	Atlantic Spadefish	37	13	0	50
M. saxatilis	Striped Bass	24	1	23	48
M. mercenaria	Florida Stone Crab	1	43	0	44
Menticirrhus spp.	Kingfishes	32	7	0	39
M. terrapin	Diamondback Turtle	1	1	36	38
C. mydas	Green Turtle	0	0	38	38
M. cephalus	Striped Mullet	34	2	1	37
A. mediocris	Hickory Shad	35	1	0	36
M. americanus	Southern Kingfish	30	5	0	35
M. saxatilis	Northern Kingfish	19	12	0	31
A. catus	White Catfish	28	0	0	28
O. chrysoptera	Pigfish	13	13	0	26
E. lyricus	Lyre Goby	0	24	0	24
B. canaliculatus	Channeled Whelk	0	23	0	23
R. eglanteria	Clearnose Skate	0	23	0	23
Triglidae	Searobins	0	22	0	22
G. immer	Common Loon	0	0	15	15
Libinia spp.	Libinia Spider Crabs	0	12	0	12
D. cepedianum	Gizzard Shad	0	12	0	12
S. maculatus	Spanish Mackerel	7	4	0	11

Table 7 (cont). Disposition (kept, unmarketable discard, regulatory discard) by number of species observed during onboard large mesh gillnet operations from July 2009 – December 2010.

Species	CommonName	Kept	Unmarketable	Reg Discard	Total #
C. virginica	Eastern Oyster	0	9	0	9
E. saurus	Ladyfish	0	9	0	9
L. osseus	Longnose Gar	0	8	0	8
A. calva	Bowfin	0	8	0	8
C. schoepfii	Striped Burrfish	0	8	0	8
O. tau	Oyster Toadfish	0	7	0	7
Scyliorhinidae	Cat Sharks	0	6	0	6
Dasyatidae	Stingrays	0	6	0	6
R. canadum	Cobia	0	2	4	6
M. littoralis	Gulf Kingfish	6	0	0	6
L. kempi	Kemp's Ridley	0	0	6	6
S. tiburo	Bonnethead Shark	0	5	0	5
L. marinus	Great Black-backed Gull	0	0	5	5
C. carpio	Common Carp	1	3	0	4
C. limbatus	Blacktip Shark	0	3	0	3
S. aquosus	Windowpane	0	2	1	3
P. occidentalis	Brown Pelican	0	0	3	3
Busycon spp.	Whelks	2	0	0	2
C. plumbeus(milberti)	Sandbar Shark	0	2	0	2
Esox spp.	Pikes	0	2	0	2
Ictalurus spp.	Ictalurus Catfishes	1	1	0	2
I. punctatus	Channel Catfish	2	0	0	2
P. evolans	Striped Searobin	0	2	0	2
C. hippos	Crevalle Jack	0	2	0	2
B. chrysoura	Silver Perch	0	2	0	2
L. maximus	Hogfish	1	1	0	2
C. caretta	Loggerhead	0	0	2	2
B. carica	Knobbed Whelk	0	1	0	1
Mercenaria spp.	Quahogs	0	1	0	1
P. marinus	Sea Lamprey	0	1	0	1
R. terraenovae	Atlantic Sharpnose Shark	0	1	0	1
Sphyrna spp.	Hammerhead Sharks	0	1	0	1
S. dumeril	Atlantic Angel Shark	0	1	0	1
Gymnura spp.	Butterfly Rays	0	1	0	1
M. atlanticus	Tarpon	0	1	0	1
P. olivaris	Flathead Catfish	1	0	0	1
Belonidae	Needlefishes	0	1	0	1
Hippocampus spp.	Seahorses	0	1	0	1
M. americana	White Perch	0	1	0	1
M. microlepis	Gag	0	0	1	1
R. remora	Remora	0	1	0	1
L. surinamensis	Atlantic Tripletail	1	0	0	1
Mugil spp.	Mullets	0	1	0	1
T. onitis	Tautog	1	0	0	1
P. triacanthus	Butterfish	1	0	0	1
A. quadrocellata	Ocellated Flounder	0	1	0	1
T. maculatus	Hogchoker	0	1	0	1
B. capriscus	Gray Triggerfish	1	0	0	1
Lagocephalus spp.	Lagocephalus Puffers	0	1	0	1
C. guttata	Spotted Turtle	0	0	1	1
E. imbricata	Hawksbill Turtle	0	0	1	1

Table 8. Disposition (kept, unmarketable discard, regulatory discard) by number of species observed during onboard small mesh gillnet operations from July 2009 – December 2010.

Species	CommonName	Kept	Unmarketable	Reg Discard	Total #
Menticirrhus spp.	Kingfishes	7,486	529	0	8,015
B. tyrannus	Atlantic Menhaden	5,617	1,467	0	7,084
M. undulatus	Atlantic Croaker	5,642	6	0	5,648
C. regalis	Weakfish	588	5	6	599
S. acanthias	Spiny Dogfish	3	19	457	479
C. nebulosus	Spotted Seatrout	375	2	26	403
P. triacanthus	Butterfish	364	0	0	364
A. mediocris	Hickory Shad	240	80	0	320
M. cephalus	Striped Mullet	310	5	0	315
P. lethostigma	Southern Flounder	13	0	244	257
M. canis	Smooth Dogfish	0	220	0	220
P. saltatrix	Bluefish	151	58	0	209
L. xanthurus	Spot	196	4	0	200
P. cromis	Black Drum	64	96	0	160
S. ocellatus	Red Drum	11	0	79	90
C. sapidus	Blue Crab	4	35	0	39
M. americanus	Southern Kingfish	36	1	0	37
Libinia spp.	Libinia Spider Crabs	0	19	0	19
Scyliorhinidae	Cat Sharks	0	19	0	19
E. lyricus	Lyre Goby	0	19	0	19
M. saxatilis	Northern Kingfish	18	0	0	18
D. cepedianum	Gizzard Shad	0	16	0	16
L. rhomboides	Pinfish	1	15	0	16
Alosa spp.	River Herrings	0	0	14	14
T. lepturus	Atlantic Cutlassfish	13	0	0	13
A. probatocephalus	Sheepshead	4	7	0	11
M. americana	White Perch	7	2	0	9
N. stenoglossa	Conchs	3	4	0	7
A. sapidissima	American Shad	7	0	0	7
M. littoralis	Gulf Kingfish	7	0	0	7
C. virginica	Eastern Oyster	0	6	0	6
Triglidae	Searobins	0	6	0	6
O. chrysoptera	Pigfish	6	0	0	6
P. auritus	Double-crested Cormorant	0	0	6	6
M. mercenaria	Florida Stone Crab	0	5	0	5
L. polyphemus	Horseshoe Crab	0	4	0	4
Mugil spp.	Mullets	4	0	0	4
S. maculatus	Spanish Mackerel	4	0	0	4
P. dentatus	Summer Flounder	0	0	4	4
P. albigutta	Gulf Flounder	0	0	4	4
M. saxatilis	Striped Bass	1	0	2	3
O. jamaicensis	Ruddy Duck	0	0	3	3
R. eglanteria	Clearnose Skate	0	2	0	2
Ictalurus spp.	Ictalurus Catfishes	2	0	0	2
T. carolinus	Florida Pompano	2	0	0	2
B. chrysoura	Silver Perch	0	2	0	2
G. immer	Common Loon	0	0	2	2
G. micrura	Smooth Butterfly Ray	0	1	0	1
L. osseus	Longnose Gar	0	1	0	1
D. petenense	Threadfin Shad	1	0	0	1
O. oglinum	Atlantic Thread Herring	0	1	0	1
C. faber	Atlantic Spadefish	0	1	0	1
T. alalunga	Albacore	1	0	0	1
Peprilus spp.	Peprilus Butterfish	0	1	0	1
Paralichthys spp.	Paralicthid Flounders	0	0	1	1
P. occidentalis	Brown Pelican	0	0	1	1

Discard Mortality

There were 1,989 regulatory discards assessed as alive or dead upon capture in large mesh gillnets, and most (80%) were alive (Table 8). Combining areas and seasons, an overall at net mortality (discard mortality) rate of 27% was applied to regulatory discards in these nets. Discard mortality for southern flounder was 13% (n = 141); 20% for red drum (n = 58); 9% for striped bass (n = 2); and 76% for weakfish (n = 25).

In small mesh operations, 387 regulatory discards were assessed as alive or dead. An overall discard mortality rate of 32% (Table 9) was observed in small mesh gillnet operations. Discard mortality rates were 50% for striped bass (n = 1), 38% for red drum (n = 30), and 3% for southern flounder (n = 8).

Table 9. Relative percent discard mortality of all at net regulatory discards observed during onboard large mesh gillnet operations.

Species	Common Name	# Alive	# Dead	Total Discards	% Discard Mortality
P. lethostigma	Southern Flounder	923	141	1,064	13
S. ocellatus	Red Drum	235	58	293	20
P. auritus	Double-crested Cormorant	174	117	291	40
P. albigutta	Gulf Flounder	89	29	118	25
P. dentatus	Summer Flounder	43	7	50	14
M. terrapin	Diamondback Turtle	30	5	35	14
C. mydas	Green Turtle	28	10	38	26
M. saxatilis	Striped Bass	21	2	23	9
G. immer	Common Loon	12	3	15	20
C. regalis	Weakfish	8	25	33	76
L. marinus	Great Black-backed Gull	4	1	5	20
Paralichthys spp.	Paralicthid Flounders	3	0	3	0
P. occidentalis	Brown Pelican	3	0	3	0
R. canadum	Cobia	2	2	4	50
L. kempi	Kemp's Ridley	2	4	6	67
M. microlepis	Gag	1	0	1	0
C. nebulosus	Spotted Seatrout	1	2	3	67
S. aquosus	Windowpane	1	0	1	0
C. guttata	Spotted Turtle	1	0	1	0
C. caretta	Loggerhead	1	0	1	0
E. imbricata	Hawksbill Turtle	0	1	1	100

Table 10. Relative percent discard mortality of all at net regulatory discards observed during small mesh gillnet operations.

Species	Common Name	# Alive	# Dead	Total Discards	% Discard Mortality
P. lethostigma	Southern Flounder	231	8	239	3
S. ocellatus	Red Drum	49	30	79	38
C. nebulosus	Spotted Seatrout	14	12	26	46
Alosa spp.	River Herrings	12	2	14	14
C. regalis	Weakfish	5	1	6	17
P. dentatus	Summer Flounder	4	0	4	0
P. albigutta	Gulf Flounder	4	0	4	0
M. saxatilis	Striped Bass	1	1	2	50
Paralichthys spp.	Paralicthid Flounders	1	0	1	0
P. occidentalis	Brown Pelican	1	0	1	0
P. auritus	Double-crested Cormorant	1	5	6	83
O. jamaicensis	Ruddy Duck	1	2	3	67
G. immer	Common Loon	0	2	2	100

DISCUSSION

NCDMF has been collecting observer data at varying coverage and funding rates since 2004. Observer coverage provides a better characterization of the gillnet fisheries with regard to effort, catch, bycatch, gear and seasonality. These data types can be used for the purpose of providing critical information needed to the federal and state FMP process, to identify potential geographical areas of concern with regard to protected species issues, to manage policy and regulation with regard to stock assessment and to ultimately assist in sustaining the resources while maintaining commercial fisheries throughout North Carolina's estuarine waters.

Observer coverage was spatially distributed throughout the estuarine waters of North Carolina based upon the commercial fisheries' response to the variability and the seasonality of the fisheries. For the period of July 1, 2009 - December 31, 2010, 831 gillnet observations were made, 582 in the large mesh gillnet fishery and 249 in the small mesh gill net fishery. Seasonal coverage levels ranged from 2.23% to 6.96% for this period, combining both onboard and AP observations in both the small and large mesh gillnet fisheries.

With the gill net restrictions issued by proclamation M-8-2010, it is estimated that there has been an overall reduction of effort in the range of 40 - 50% since June 2010, within the large mesh gillnet fisheries of North Carolina. Even with these reductions, the utilization of large mesh gillnets still seems to remain a viable means for commercial fishermen to sustain a part of their livelihoods. Within the large mesh gill net fishery, southern flounder were the predominant species targeted, caught and kept; with 11,630 kg landed from July 1, 2009 - December 31, 2010. Atlantic menhaden continued to be the predominant unmarketable bycatch species caught in both large and small mesh gill nets.

The need and requirement for an ongoing observer program continues within North Carolina. Observer coverage is now required year round at a coverage rate no less than 7%, with targeted observer coverage of 10%. With these levels of coverage, it is our hope to provide continued disposition and species interaction data which will provide an additional source of data to better manage these fisheries throughout North Carolina's estuarine waters.

LITERATURE CITED

ESA 1973. Endangered Species Act, 1973.

Brown, K.B. 2009. Completion Report for NOAA Award No.NA05NMF4741003 Study II Documentation and reduction of Bycatch in North Carolina Fisheries Job 3: Characterization of the near-shore commercial shrimp trawl fishery from Carteret County to Brunswick County, North Carolina

MMPA 1972. Marine Mammal Protection Act, 1972.

Price A. B. and C. Van Salisbury 2007. Low-Profile Gillnet Testing in the Deep Water Region of Pamlico Sound, NC. Completion Report for Fishery Resource Grant # 06-FEG-02. Operations Conducted under Endangered Species Act Research Permit # 1563. 19pp.

Price B. 2007. Estuarine Observer Program in North Carolina. Final Report. U.S. Fish & Wildlife Service Sport Fish Restoration Grant No. NC-F-83-R. 44pp.

Price B. 2009. Estuarine Bycatch Assessment in NC Commercial Fisheries. Completion report for NOAA Grant # NA07NMF4740061 National Marine Fisheries Service ACCSP. North Carolina Dep. of Environment and Natural Resources, Division of Marine Fisheries. 19pp.